REMARKS

Claims 1 to 17 are under consideration.

New claims 18 through 24 are being submitted.

New claim 18 is essentially based on claim 9.

New claim 19 is based on Fig. 2.

New claim 20 is based on the specification, page 15, lines 15 to 18.

New claim 21 is based on claim 18.

New claim 22 is based on claim 19.

New claim 23 is based on claim 21.

New claim 24 is based on claim 22.

New claim 25 is based on Fig. 3.

The Office Action refers to Claim Rejections - 35 USC § 103.

8. Claims 1-17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over DE 3824932 ('932) in view of Yamaoka and the British patent '780.

The rejection is respectfully traversed.

Regarding claims 1-17 DE '932 discloses a gas spring damper having a similar structure to that of applicant's, as readily apparent from figure 2. Note what appear to be throttles at 66, 68, however this is not entirely clear since a translation of this document is not yet available.

It is correct that the subject matter of the present application starts from the German printed Patent document DE 3824932 which reference DE 3824932 shows also an existence of two overflow throttles 66, 68, wherein the overflow throttles 66, 68 are not described in detail. As to the structuring the reference DE 3824932 mentions in column 3, lines 429 that these overflow throttles 66, 68 are only schematically indicated in the drawing and therefore carry only symbolic character in this representation. The drawing representation of the two overflow throttles 66, 68 does not support to be misinterpreted in the direction that the overflow throttles 66, 68 are formed as throttle bore holes.

These overflow throttles 66, 68 are always formed in the state-of-the-art usually such as is shown in Yamaoka.

The British patent `780 shows such "throttles" in the several figures 2,3,5,11. Note the varying shapes provided.

A gas spring damper unit is described in the reference British Patent GB 1602780. According to the reference, the piston 1 has several passage bore holes 11 disposed uniformly on a part circle, wherein the passage bore holes 11 are closed on the front side and one side of the piston 1 by a common spring plate 12 and are therewith formed as a throttle check valve. The piston 1 has a bore hole 8, a bore hole 9, a bore hole 10 as well as a radial channel 6 disposed panel to the passage bore holes 11 and forming together a bypass to the passage bore holes 11. Here the bore hole 10 is constructed as a throttle bore hole 10. The passage bore holes 11 as well as the throttle bore hole 10 permit a flow-through from the chamber Y to the chamber X, wherein the flow-through resistance is determined by the strength of the spring plate 12 and by the size of the throttle bore hole 10. A flow-through exclusively through the throttle bore hole 10 results in the opposite direction from the chamber X to the chamber Y, wherein the throttle bore hole 10 therewith solely

determines the flow-through resistance for this flow-through direction.

The damping forces of the piston cylinder unit are determined in the one direction of motion by the spring plate 12 and the constant throttle bore hole 10 and in the opposite direction solely by the constant throttle bore hole 10.

According to the Office Action, Yamaoka discloses in column 7 lines 27-36 that "the difference between the fluid pressures before and behind each of the first and second constant orifices ... is decreased and the flow velocity of the working fluid passing through each of the orifices is decreased gradually so that the Reynolds number of the fluid passing through the respective orifices is decreased". This reduces fluid noise.

According to Yamaoka the piston 12 of the damping unit has two different fluid passages 20 and 22, which connect the pressure chambers 14 and 16 to each other. Here one fluid passage 20 on the one side of the piston 12 is closed by a first spring plate valve 24. The other fluid passage 22 on the other

side of the piston 12 is closed by a second spring plate valve 50. A flow-through from the pressure chamber 14 to the pressure chamber 16 occurs hear upon a corresponding piston motion in upward direction through the fluid passage 20, since the spring plate valve 24 lifts of its seat. The other fluid passage 22 is blocked during this piston motion, since the spring plate valve 50 is pressed on its seat.

A flow-through from the pressure chamber 16 to the pressure chamber 14 occurs through the fluid passage 22 upon a piston motion downwardly, since the spring plate valve 50 lifts of its seat. The spring plate valve 24 is pressed onto its seat during this piston motion such that the other fluid passage 20 is blocked off in principle.

The two spring plate valves 24 and 50 are therefore spring loaded throttle check valves, which are coordinated in each case to a direction of the piston motion and which block the fluid stream in the one direction and which allow the fluid stream to pass in the other direction in a throttled manner. The size of the

flow-through resistance is here determined essentially by the spring strength of the two spring plate valves 24 and 50. The two spring plate valves 24 and 50 are constructed of different strength, which also becomes clear from the Yamaoka reference, in order to obtain different flow-through resistances and therewith the different damping forces for the two oppositely directed motions of the piston 12.

The subject matter of the present application properly starts from this state-of-the-art and discloses in addition a newly fashioned overflow throttle, which overflow throttles is further described in more detail further down.

The reference Yamaoka describes however also some special feature, which feature does not agree neither in construction knowing function with the subject matter of the present application and the office action is directed to this feature of the Yamaoka reference.

Thus the reference Yamaoka proposes to furnish the different plates 36,38,40 and 42 with arc-shaped through

openings 36b, 38b, 40b, and 42b for generating an additional fluid passage 48. This additional fluid passage 48 is a bypass to fluid passage 22, wherein an additional fluid stream can flow from the pressure chamber 16 to the pressure chamber 14 through the additional fluid passage 48. The flow of the fluid should be calmed and be held below the critical Reynold number. Cavitations and noises are thereby avoided.

According to the subject matter of the present Invention it is intended that a turbulent flow occurs in a certain region of the piston speed. In contrast to the reference Yamaoka intends to avoid a turbulent flow.

The Office Action continues that it can therefore be seen it is known to vary the geometry of piston fluid passages (i.e. shape, cross section, size etc) to vary the fluid flow through the piston dependent upon the level of damping forces desired and/or to prevent unwanted noise

Because it is notoriously well known in the art to vary the geometry of piston fluid passages (i.e. shape, cross section, size etc) to adjust the damping properties of an absorber or spring to desired criteria one having ordinary skill in the art at the time of the invention would have found it

obvious to have modified the passages 66,68 of DE '932 as taught by `780 and Yamaoka for this reason.

In contrast to the references applied the present application discloses to employ passing through throttle bore holes instead of the throttle check valves of the reference to Yamaoka and of the British reference GB 1,206,780, wherein the passing through throttle bore holes exhibit over their length at least one cross-section narrowing. Different flow-through conditions have to be created for distinguishing the flow-through resistances of the one flow-through direction from the flow-through resistances of the other flow-through direction. For this purpose it is therefore disclosed not to furnish the cross-section narrowing within the passing through throttle bore hole not in the center but to offset the cross-section narrowing closer to one of the two ends of the bore hole. The concept of a functional effective middle point of the flow resistance was introduced to define this position similar to the usually used concepts of the spacial middle point or the mass center of gravity.

In addition the center of the throttle bore hole was designated as "radial center axis" as a reference base for the position of the functional effective middle point.

The position of the " radial center axis" and the position of the" functional effective center of gravity" are illustrated in detail in figures 7 and 8.

In order to hold the damping force nearly constant with increasing piston speed, there has to be found another force, which force replaces the spring force of the state of the art throttle check valve increasing with the path of the spring. It is disclosed for this purpose to dimension the through passing throttle bore hole such that the at small piston speeds prevailing laminar flow turns into the turbulent flow at increasing piston speeds. This turbulent flow is characterized by an increased through flow resistance such that the bodily construction of the passing through throttle bore hole had to the directed to this turbulent flow.

The new features of the present Invention relative to the German printed Patent document DE 38 24 932 are distinguished

constructively and functionally from the features taught in the references Yamaoka and British Patent GB 1,602,780. The differences in construction and function result also in different technical effects. There is nothing in the references Yamaoka and British Patent GB 1,206,780, which a person of ordinary skill in the art could combine with the German reference DE 382492. In contrast the present application replaces the conventional throttle check valves by a particular form of the throttle bore holes.

None of the references teaches the construction of applicant's bore hole throttles furnishing a direction dependent different throttling effect. The feature of the present application to employ turbulent flow relative to laminar flow to obtain a flow direction dependent different throttling effect is not taught or suggested in any one of the references applied. As applicants' throttles go from laminar flow to turbulent flow and vice versa with reversing flow direction, all three references agree not to go from laminar flow to turbulent flow when changing flow direction. Since the applicants specify the mechanical conditions

for changing flow direction and thereby laminar flow into turbulent flow in their claims, then such claims are clearly unobvious over such three references.

Applicant's limitations in the remaining claims directed to the specifics of the shape of the piston fluid passages are simply an obvious alternative design equivalent of the piston fluid passages in DE '932, as modified above simply dependent upon the damping characteristics of the spring desired.

Applicants urge that none of the references teaches or suggests the construction specifications presented in the subclaims of the present application.

Reconsideration of all outstanding rejections is respectfully requested.

All claims as presently submitted are deemed to be in form for allowance and an early notice of allowance is earnestly solicited.

Respectfully submitted,

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